be ready for occupancy in about a year and a half. The cost of the buildings will be about half a million dollars.

THE department of pharmacy of the Oregon Agricultural College has been notified of its acceptance as a member of the American Conference of Pharmaceutical Faculties.

THE will of the late Mr. George May, mining engineer and colliery proprietor, of Darlington, bequeaths £500 to the North of England Institute of Mining Engineers, the income to be applied in providing "George May" prizes for students, and 500*l.* to Armstrong College, Newcastle, to found a "George May" scholarship in mining.

PROFESSOR HERBERT COUPER WILSON, of Carlton College, has been appointed visiting lecturer in astronomy, at Harvard University. Marshal Fabyan has been promoted to be assistant professor of comparative pathology.

## *DISCUSSION AND CORRESPONDENCE*

### PARASITES OF THE MUSKRAT

IN a recent number of the *Journal of Parasitology*,[1] Professor Al. Mrázek, professor of zoology, Bohemian University, Prague, called the attention of American helminthologists to the opportunity for study of the parasites of one of the most typical North American mammals.

We announced in a recent number of SCIENCE[2] the finding of a varied and abundant parasitic fauna in muskrats in Nebraska and called attention to the important, virgin and fertile nature of this field for the parasitologist and the need and value of a thorough survey of the parasitic fauna of our common North American animals.

A study of the parasites of the muskrats, now practically completed, gives the following data. In forty-two muskrats, 881 parasites were found. No parasites were found in four muskrats, three harbored cestodes, trematodes and nematodes and three harbored a single species of trematode. The parasites found represent nine species of trematodes, of which three belong in the genus *Echinostomum* and one in each of the following genera, *Echinoparyphium, Notocotyle, Catatropis, Plagiorchis, Hemistomum,* and a new genus *Wardius.* Two species of cestodes were found belonging in the genera *Hymenolopis* and *Anomotaenia* and three species of nematodes, belonging in the genera *Trichiurus, Trichostrongylus* and *Capillaria.* The description of these parasites is given in the June number of the Journal of Parasitology, Vol. 1, No. 4.

FRANKLIN D. BARKER
THE UNIVERSITY OF NEBRASKA

### THE CHEMICAL COMPOSITION OF BORNITE

IN SCIENCE for September 17, 1915, Professor Austin F. Rogers admirably summed up the evidence as to the composition of bornite, and concluded that the best explanation of the known facts is that the mineral consists of a solid solution of varying amounts of chalcocite, $Cu_2S$, in a normal bornite, $Cu_3FeS_3$. The object of this note is to bring forward another possible interpretation.

Since chalcocite is of common occurrence as inclusions in bornite the assumption that it may unite with the latter in solid solution is a reasonable one. But inclusions of chalcopyrite, $CuFeS_2$, and even of pyrite, $FeS_2$, are likewise frequently found, so it can not be denied that these minerals may also form solid solutions in the bornite. The clustering of analysis points in the diagram around $Cu_5FeS_4$ may then be accepted as "evidence that [normal] bornite has the formula $Cu_5FeS_4$" without excluding the possibility of solid solution, because the analyses lying in the diagram to the left of the $Cu_5FeS_4$ point may well be those which contain the chalcopyrite in solid solution, the absence of analyses far to the left of the $Cu_5FeS_4$ point indicating that this is the limit of solubility of chalcopyrite in bornite: $Cu_5FeS_4 + CuFeS_2 = 2Cu_3FeS_3$. The entrance of pyrite in solid solution would also account at least in part for those analyses lying above the diagonal line, and it need not be assumed that they are erroneous.

There is, however, another way of explaining variability in composition of the type shown

[1] 1914, Vol. No. 2, p. 104.
[2] 1913, Vol. 37, p. 268.

by bornite, which has perhaps not received the attention from mineralogists it deserves. Are we certain that the absence of inclusions of such size as to be visible under the microscope (in this case, the metallographic microscope) necessitates the hypothesis of the existence of solid solution at all? In metallographic study inclusions may be seen to vary more or less continuously from microscopically visible sizes down to the limit of microscopic visibility, which lies in the general neighborhood of 0.001 mm. in diameter. This lower limit is determined by the wave-length of light, and has no significance as far as chemical molecules are concerned. It can therefore not be expected that the variation in the size of inclusions ceases at that particular point; in all probability they also occur of submicroscopic size. Accordingly, as an alternative hypothesis to that of Professor Rogers the writer would suggest that the variability in the composition of bornite (normally $Cu_5FeS_4$) is due to the presence of submicroscopic inclusions of one or more of the minerals often occurring as visible inclusions in it, namely chalcocite, chalcopyrite and pyrite.

EDGAR T. WHERRY
U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

## WIND GAPS

ARE physiographers unconsciously predisposed in favor of an explanation of topographic phenomena which possesses a dramatic element as against one which, though quite obvious, involves only the operation of causes which are commonplace?

An examination of the explanation given of the formation of wind gaps by writers of American text-books on physical geography and geology would seem to answer this question in the affirmative.

All who treat this topic, so far as I have been able to determine, explain wind gaps—all of them—as deserted water gaps—vestigial structures, as it were, inherited from a certain stage in a past cycle of erosion.[1]

In this explanation all these writers hark back to the original source, the monograph by Bailey Willis on "The Northern Appalachians" (American Book Company, 1895). It is true that the monograph itself refers to earlier sources—to the work of Davis and Hayes and Campbell—but the constancy of reference by these text-book authors to Snickers Gap, cited in the monograph as a type illustration of a wind gap, and the reproduction of the two diagrammatic maps, there first printed as illustrations accompanying the explanation of same, indicate this monograph of Bailey Willis as the true source.

It is not the purpose of this article to detract from the general admirable treatment of mountain structure contained in the above treatise. It is one of the American physiographic classics, replete with that wealth of imagery derived from human activity which so characterizes a writer on physiography of the school of Davis. In that monograph streams now "leap" and now "loiter"; they "ripple over gravel bars" or "linger between alluvial banks"; they commit "piracy" and "conquer their neighbors."

It does seem to the writer, however, that a danger to scientific accuracy lurks in this imagery. An explanation that applies in the vast majority of instances is lost sight of because prosaic.

As a substitute, therefore, for the—beheading—diverting—reversing—stream processes, which must concur in the formation of every wind gap, it would seem, in the view of the writers of the above school of physiography, I would suggest the following:

A wind gap in the vast majority of instances is simply a col in the top of the divide, notched by the retreat of the sources of two

[1] Salisbury and Atwood, "Interpretation of Topographic Maps," p. 51. Salisbury, Atwood, and Barrows, "Text-book on Physiography." Tarr and Martin, "College Physiography," p. 567. Tarr, "New Physiography," p. 104. Hobbs, "Earth Features and Their Meaning," pp. 176, 177. Dryer, "Lessons in Physical Geography," p. 160. Emmerson, "Manual of Physical Geography." Trafton, "Laboratory and Field Exercises in Physical Geography," p. 19. Scott, "An Introduction to Geology," p. 448. Chamberlin and Salisbury, "Geology." Part I., p. 139.